

Human Embryo's Developmental Stages of Fertilization, Implantation and 'Alaqah (A Comparative Study of Islam and Embryology)

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Abstract

Man has worked hard to reveal the mystery of his creation from the time immemorial and has now succeeded to cognize truths of scientific nature about the process of his creation with the help of the science of embryology. Beside this information man's knowledge regarding his creation is supplemented by those verses of Qur'ān and sayings of the Prophet (PBUH) that revolves around this topic. The present article evaluates the similarities and differences between the two versions in a comparative manner. The comparison will include information about the colour and textures of male and female reproductive substances, fertilization, implantation and the 'alaqah.

Key words: Fertilization, Amshāj, Implantation, 'Alaqah.

The word Islam is etymologically derived from the root *slm* which literally means peace and Islam as religion denotes peaceful submission to Allah Almighty. Historically, Islam was born in Arabia,¹ but Qur'ān clearly mentions that all divine messengers and their followers were Muslims. Thus Islam appears as a generic term that gradually and continuously got evolved in the successive Divine revelation. Every new revealed book and messenger constituted new elements to previous *Shari'ah*, the climax of which was reserved for the last revealed Book, the Qur'ān.² It is an ocean of knowledge that contains many wonderful jewels. The secret of these jewels is hidden in its ultimate aim of calling people to Allah Almighty (Monotheism) through his last messenger, the Prophet Muḥammad (PBUH). Many studies have been conducted to check the compatibility of Islamic sciences to sciences generally and creation of man particularly. In this regards a comparative study of fertilization, implantation and also 'alaqah is carried out to find similarities and dissimilarities, if any, of these two sources of knowledge, i.e. Islam and embryology.

Fertilization, Implantation and 'alaqa in the Islamic Context:

Qur'ān and aḥādīth both describe human creation in many places. While describing the process of Man's creation, Qur'ān mentions male and female reproductive fluids in eleven different places whereas a ḥadīth of the Prophet (PBUH) describes the different nature and textures of these fluids as:

“Man's discharge (i.e. Sperm) is thick and white and the discharge of woman is thin and yellow.”³

This explanation of different characteristics of genital materials further elaborates the portion of these fluids that take part in human embryo's creation. Prophet (PBUH) said;

“The child does not come from all the liquid (semen).”⁴

The Qur'ān equates these participating fluids with Arabic terminology *sulālah* (quintessence) in Sūrah al-Sajdah as;

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“ثُمَّ جَعَلَ نَسْلَهُ مِنْ سَلَالَةٍ مِنْ مَاءٍ مَمْهِينٍ”⁵

“And then made his progeny from a quintessence of the nature of a fluid despised.”

The above mentioned verse is firstly, pointing towards the facts that reproductive substance is the quintessence of every part of the body but due to its issuance from the urinary track it appears despicable. Secondly, this quintessence also appears to be applicable to the sperms because these sperms are the most essential part of the semen and without sperms the process of creation cannot proceed. Thirdly, the term also embraces that single motile sperm, one among many others, that succeeded in fertilizing female ovary. This mingling of reproductive substances as a key of creation has been described as *amshāj* in Sūrah al Dahr:

“إِنَّا خَلَقْنَا الْإِنْسَانَ مِنْ نُطْفَةٍ أَمْشَاجٍ نَبْتَلِيهِ فَجَعَلْنَاهُ سَمِيعًا بَصِيرًا”⁶

“Verily we created man from a drop of mingled sperm.”

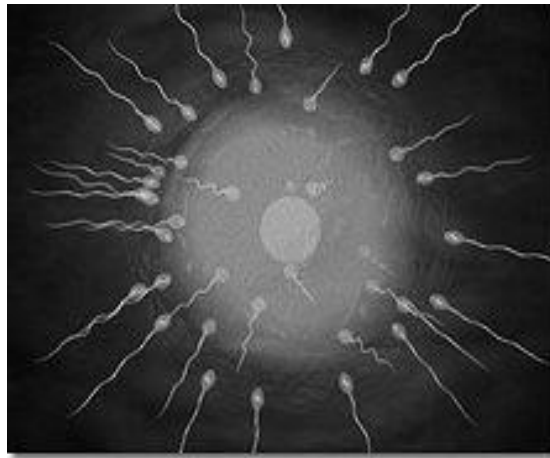


Figure 1. An oocyte and spermatozoa

The next phase that is marked by the Qur’ān and ḥadīth is the penetration of this mingled substance into mother's womb. The Qur’ān says:

“اللَّهُ يَعْلَمُ مَا تَحْمِلُ كُلُّ أُنْثَىٰ وَمَا تَغِيضُ الْأَرْحَامُ وَمَا تَزْدَادُ”⁷

“Allah knows what every female womb bears and what is penetrating into the womb.”

This Qur’ānic āyah covers two important points:

1. Allah knows what every female womb bears, here this bearing firstly appears to mean the normal or abnormal development of the organs or capabilities of the human embryo.⁸ Secondly, it is describing the gender, physical appearance and destiny of the embryo.⁹
2. The term penetration is highlighting the journey of these mixed germinal fluids to reach its destination where it will stay till its birth.

The penetration is succeeded by implantation of the embryo in the Glorious Qur'an as:

فَجَعَلْنَاهُ فِي قَرَارٍ مَّكِينٍ ۝ إِلَى قَدَرٍ مَّعْلُومٍ¹⁰

"Then We put it in a Place of rest, firmly fixed. For a period (of gestation), determine (according to need)."

The above mentioned ayah also embraces two important points

1. A place where embryo fixed firmly
2. A specific period of gestation

It appears from the above ayah that in the mother's uterine wall human embryo cannot fix itself at any point rather there are specific places designed by Allah for the fixation of embryo for a period of time that He has specified. But for this fixation the embryo transforms itself to the new shape that the Qur'an has mentioned as:

ثُمَّ خَلَقْنَا النُّطْفَةَ عَلَاقَةً¹¹

"Then we change the drop into an 'alaqah."

1. The Arabic term 'alaqah has different meaning; like coagulated blood, be suspended and leech.¹²

Fertilization, Implantation and 'Alaqah in the Embryological Context:

Embryology defines fertilization as a series of changes that takes place before the first cell division and after fusion of male and female reproductive substance.¹³ Thus fertilization embraces two stages; approaching of male and female gametes and their fusion.¹⁴ The nucleus of each gamete contains 23 numbers of Chromosomes (N) and their fusion restore the total 46 (2N) chromosomes.¹⁵

These two gametes reside in two different reproductive substances having different texture; physical properties, composition and viscosity. The male reproductive substance (semen), white in color and is composed of 5% secretion of Cowper and Litter gland, 15-30 % is derived from Prostate, small contribution of ampulla and epididymis and majority portion consists of the secretion of seminal vesicles.¹⁶ Sperm counts form the 10 % of the semen and usually a fertile man contains 100 million sperms/milliliters semen.¹⁷ It is viscous substance and its viscosity is greater than water. The average viscosity of whole semen is 3.92 centipoise (cp) while the viscosity of water is 0.8904/ 0.6915 centipoise (cp).¹⁸

The female reproductive substance is scientifically termed as follicular substance which insides the follicle provide a specific environment for the maturation of granulose cells and the oocyte. Follicular fluid is organically composed of steroids and pituitary hormones.¹⁹ This FF is has straw color and intensity of its yellowish color varies²⁰ with the viscosities ranges between 1.3 to 1.8 (cp).²¹

The zygote thus formed from the fusion of male and female gametes passes through changes to attain the form of an embryo that will move through the oviduct to reach the uterus. After reaching the uterus the embryo makes contact with the uterine wall.²² In the uterine wall apical protrusions are formed which is named as pinopodes, where the embryo attaches itself.²³

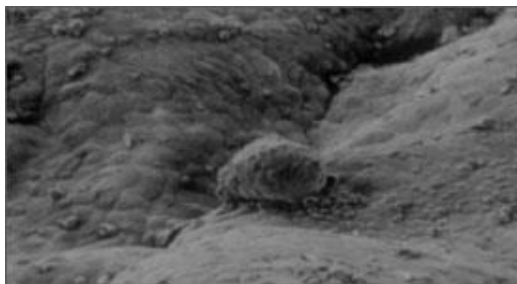


Figure 2 The blastocyst attaches to the pinopodes through an electron microscope.

This attachment is done through few trophoblast cells. These cells proliferate rapidly and differentiate into two different types of cells: 1) the cytotrophoblast, 2) the syncytiotrophoblast. In the end of first week the finger like processes of syncytiotrophoblast extends through endometrial connective tissues to succeed in superficial attachment of blastocyst in endometrium.²⁴ The syncytiotrophoblast release protease to break down the cells of uterine endometrium and penetrates deep into stroma to erode the endothelial lining of maternal capillaries and maternal blood enter the lacunar system of the embryo.²⁵ Now conceptus derives its nutritional need from the maternal blood stream.²⁶ In three weeks of development blood island appear in mesoderm that were induced by fibroblast growth factor 2 (FGF2) to form heman-gioblast that are the precursors of blood cell and vessels formation.²⁷

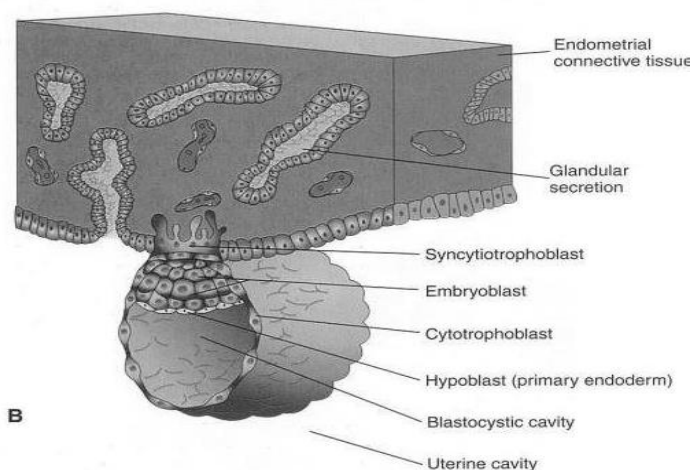


Figure 3. Seven days; the syncytiotrophoblast has penetrated the epithelium and has started to invade the endometrial connective tissue

Comparison:

In the light of the above mentioned details of embryological stages of Islam and science, a comparative approach is employed to emphasize the similarities and differences of Islam and

Science regarding this topic. Firstly, the information about the nature and texture of reproductive substances of male and female present in the ḥadīth coincides with scientific information. Ḥadīth describes male reproductive substance as thicker than female and the same fact is explained in science when the difference of viscosity reveals the thickness of semen over female reproductive substance. The viscosity of semen is 3.92 centipoise (cp) while that of female substance ranges from 1.3 to 1.8 centipoise (cp). Similarly, the information of ḥadīth regarding yellowish and white color of these reproductive substances of female and male (respectively) overlaps the scientific information that also accept the same colors of female and male substances.

Secondly, the Qur'ānic philosophy that not only considers the reproductive substances as the quintessence of every part of the body, but also affirms that sperms as the quintessence of reproductive substance have their justification in science. When science proves that reproductive substances are not only constituted of the secretions of many parts of the body, but also supports the Qur'ānic claim that sperms are the quintessence of reproductive substances. Thirdly, the Qur'ānic terminology of *amshāj* (mingled sperms) equates the process of fertilization in which haploid male and female sperms mingled to restore the diploid chromosome. Fourthly, the Qur'ānic information regarding "places of rest, firmly fix" gets its elaboration in scientific stages of implantation, in which embryo gets fixed in the mother's uterine wall on fix places called pinopodes.

Fifthly, the Qur'ānic term '*alaqah* that signifies the changes through which embryo pass after implantation, have been differently explained by different Muslim scholars. Some takes this Arabic term in the meaning of congeal blood, others takes it as hanging substance and few as leech like structure. When these three different meanings are evaluated in embryological context one finds that in the end of the first week when an embryo attaches itself to the uterine wall with the help of the finger like processes of syncytiotrophoblast. It further penetrates to mother's uterine endometrium by releasing protease that will help in eroding maternal capillaries. At this stage embryo resembles to leech because syncytiotrophoblast of embryo are now comparable with the jaws of leech. As, Leech also attaches itself to its hosts with the help of its jaws and sucks blood to derive nutrients. Similarly, human embryo not only attaches itself with mother endometrium like leech but also obtains its nourishment from the mother's blood. And in the third week the blastocyst appears suspended in the chronic cavity through a connecting stalk that justifies the second Qur'ānic meaning of '*alaqah* as suspended thing. In the same third week blood island appears in embryo that are the precursors of vessels and blood cells that give embryo the congealed blood like appearance.

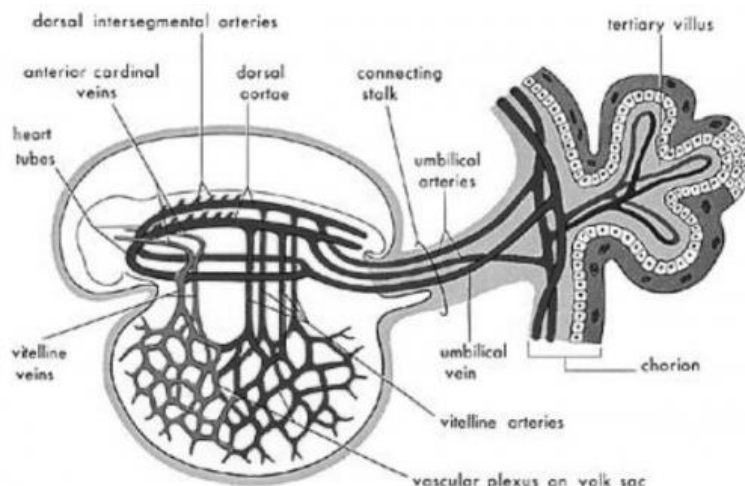


Figure 4. The external appearance of the embryo and its sacs is similar to that of a blood clot, due to the presence of relatively large amounts of blood present in the embryo. (*The Developing Human*, Moore, 5th ed., p. 65.)

Conclusion :

In the light of the above discussion, it can be concluded that Islamic and embryological information shares the same information about the tools of creation; male and female reproductive substances. These two different sources of information not only coincides with the physical properties (colour, texture and viscosity) of these reproductive fluids, but also share the same groundings by pointing out that these reproductive substances (with gametes) constitute the quintessence of creation. The first stage of creation which has different terminology in the Qur'ān (*amshāj*) and embryology (fertilization), overlaps in details; entrance of sperm to the ova and its journey to the place. The Qur'ān describes it as the place of embryo fixation and embryology named it as pinopodes. Similarly the next stage of the embryo in the Qur'ān is '*alaqa*, which has meanings; leech like, congealed blood or suspended thing. Apparently these meanings appeared contradictory from each other, but when these are compared with embryological findings the results are again in affirmation of the Islamic knowledge.

Endnotes

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- 7 Sūrah Ar-Ra'd, Āyah No. 8.
- 8 Syed Abul A'lā Mawdūdī, *Meaning of the Qur'ān*, 35 ed., vol. 2 (Lahore: Tarjumān al Qur'ān, 2003), 448-49.
- 9 Ḥāfiẓ Ibn Kathīr, *Tafsīr Ibn Kathīr*, vol. 5 (New York: Darussalam, 2000), 242-43.

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- 21 Amy L. Reeder, "A Microfluidic Cumulus Removal Device in the Investigation of Early Embryonic Transcription" (The University of Wisconsin-Madison, 2008), 16.
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- 24 Persaud, *Before We Are Born Essentail of Embryology and Birth Defects*, 33.
- 25 T. W. Sadler, *Langman's Medical Embryology*, 9th ed. (Maryland: Lippincott Williams and Wilkins, 2003), 54.
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- 27 Sadler, *Langman's Medical Embryology*, 102.

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